

What is claimed is:

1. A washing machine having a partial washing apparatus that removes dirt from an article to be washed by feeding a washing liquid agitated by supersonic vibration to the article to be washed,

5 wherein the partial washing apparatus is fitted to the washing machine proper with a holding member that holds the partial washing apparatus movably relative to the washing machine proper.

10 2. A washing machine having a partial washing apparatus as claimed in claim 1,

wherein the holding member is slidably fitted into a hole formed vertically in the washing machine and is fixed in a desired position with a stopper member.

15 3. A washing machine having a partial washing apparatus as claimed in claim 1,

wherein the washing machine proper has a hole formed vertically therein, and the holding member is substantially L-shaped and is, at one end, slidably fitted into the hole, with the partial washing apparatus fixed at another end of the holding member.

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4. A washing machine having a partial washing apparatus as claimed in claim 1,

wherein the holding member comprises:

a holding portion to which the partial washing apparatus is fixed;
a supporting portion that is fitted to the washing machine proper; and
a rotating portion that rotatably couples the holding portion to the supporting portion.

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5. A washing machine having a partial washing apparatus that removes dirt from an article to be washed by feeding a washing liquid agitated by supersonic vibration to the article to be washed,

wherein the partial washing apparatus comprises:

10 a supersonic resonator for generating supersonic vibration; and

a supersonic vibration horn for amplifying the supersonic vibration, the supersonic vibration horn being arranged with a tip thereof placed near the article to be washed.

15 6. A washing machine having a partial washing apparatus as claimed in claim 5,

wherein the washing machine proper has a lid that is opened by being folded in two portions, of which the portion that lies in front permits the partial washing apparatus to be fitted thereon approximately at a lateral center thereof.

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7. A washing machine having a partial washing apparatus as claimed in claim 5,

wherein the partial washing apparatus has a cover that is movable between a

position in which it exposes the supersonic vibration horn and a position in which it covers the supersonic vibration horn.

8. A washing machine having a partial washing apparatus as claimed in
5 claim 7,

wherein the cover has an end surface at a tip thereof subjected to a friction reduction process.

9. A washing machine having a partial washing apparatus as claimed in
10 claim 5, further comprising:

a bracket member that is detachably attachable to the washing machine proper,

wherein the partial washing apparatus is fitted to the washing machine proper with the bracket member.

10. A washing machine having a partial washing apparatus that removes dirt from an article to be washed by feeding a washing liquid agitated by supersonic vibration to the article to be washed,

wherein the partial washing apparatus comprises:

20 a supersonic resonator for generating supersonic vibration;

a supersonic vibration horn for amplifying the supersonic vibration, the supersonic vibration horn being arranged with a tip thereof placed near the article to be washed; and

a liquid-feed tank for storing the washing liquid, which is fed therefrom to the tip of the supersonic vibration horn.

11. A washing machine having a partial washing apparatus as claimed in
5 claim 10,

wherein the liquid-feed tank has a recessed portion, in which the supersonic resonator is arranged.

12. A washing machine having a partial washing apparatus as claimed in
10 claim 10, further comprising:

a case that covers the partial washing apparatus and that has a slit formed therein in which the article to be washed is inserted,

wherein the washing liquid agitated by the supersonic vibration is fed to the article to be washed inserted in the slit.

13. A washing machine having a partial washing apparatus as claimed in
claim 12,

wherein the partial washing apparatus has an upper cover and a lower cover arranged below the upper cover, and the article to be washed inserted in the slit is
20 placed between the upper and lower covers,

wherein the upper cover is so curved as to be convex downward, with an opening formed at a bottom, and the washing liquid is fed to an inner portion of the upper cover,

wherein the lower cover is so curved as to be convex upward, with an opening formed at a top, and

wherein the tip of the supersonic vibration horn is arranged in the opening of the upper cover at a level identical with or lower than that opening.

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14. A washing machine having a partial washing apparatus as claimed in claim 13,

wherein the partial washing apparatus has a solid soap chamber for storing a cake of solid soap with a lower end thereof exposed,

10 wherein the solid soap chamber has a pressing portion for pressing the solid soap downward so as to keep the lower end of the solid soap at a level approximately identical with the tip of the supersonic vibration horn.

15 15. A washing machine having a partial washing apparatus as claimed in claim 10,

wherein the partial washing apparatus has a solid soap chamber for storing a cake of solid soap with a part thereof exposed, and the solid soap is applied to the article to be washed when water is fed to the article to be washed.

20 16. A washing machine having a partial washing apparatus as claimed in claim 10,

wherein the liquid-feed tank permits a plurality of washing liquids to be stored separately so that one of the washing liquids can be selectively fed to the

article to be washed.

17. A washing machine having a partial washing apparatus as claimed in claim 16,

5 wherein the partial washing apparatus comprises:

the liquid-feed tank having a plurality of reservoirs;

a pumping device for feeding a washing liquid from the reservoirs to the article to be washed;

10 a plurality of valves provided one between each of the reservoirs and the pumping device;

an input device that issues an instruction that one of the valves be selectively opened; and

15 a controller that opens one of the valves in accordance with the instruction from the input device and that then drives the pumping device.

18. A washing machine having a partial washing apparatus as claimed in claim 16,

wherein the liquid-feed tank is composed of a plurality of liquid-feed tanks of which one is selectively fitted to the partial washing apparatus.

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19. A washing machine having a partial washing apparatus that removes dirt from an article to be washed by feeding a washing liquid agitated by supersonic vibration to the article to be washed,

wherein the washing liquid is functional water obtained by altering properties of tap water in such a way that it offers higher detergent solubility or higher supersonic transmission efficiency.

5 20. A washing machine having a partial washing apparatus as claimed in claim 19,

 wherein the functional water is acidic-ion or alkaline-ion water obtained by electrolyzing tap water.

10 21. A washing machine having a partial washing apparatus as claimed in claim 19,

 wherein the functional water is soft water obtained by removing a hard-water content from tap water.

15 22. A washing machine having a partial washing apparatus as claimed in claim 19,

 wherein the functional water is obtained by deaerating tap water by removing therefrom gas contents dissolved therein.

20 23. A washing machine having a partial washing apparatus as claimed in claim 19,

 wherein the partial washing apparatus has a ultrasonic vibration horn for amplifying the supersonic vibration.

24. A washing apparatus that washes an article to be washed by feeding a washing liquid stored in a liquid-feed tank to the article to be washed,

wherein the liquid-feed tank permits a plurality of washing liquids to be stored separately so that one of the washing liquids can be selectively fed to the article to be washed.

25. A washing apparatus as claimed in claim 24, comprising:

the liquid-feed tank having a plurality of reservoirs;

a pumping device for feeding a washing liquid from the reservoirs to the article to be washed;

a plurality of valves provided one between each of the reservoirs and the pumping device;

an input device that issues an instruction that one of the valves be selectively opened; and

a controller that opens one of the valves in accordance with the instruction from the input device and that then drives the pumping device.

26. A washing apparatus as claimed in claim 25,

wherein the washing liquid is fed to the pumping device by being allowed to drop freely into the pumping device.

27. A washing apparatus as claimed in claim 24,

wherein the liquid-feed tank is composed of a plurality of liquid-feed tanks of which one is selectively fitted to the washing apparatus.

28. A washing apparatus as claimed in claim 27, further comprising:

5 a pumping device for feeding the washing liquid from the liquid-feed tank to the article to be washed,

wherein the pumping device is a magnet-coupled pump composed of a motor portion and a pump portion that are detachably held together by magnetism, and

10 wherein the pump portion is attached to and detached from the motor portion integrally with the liquid-feed tank.

29. A washing apparatus that removes dirt from an article to be washed by feeding a washing liquid agitated by supersonic vibration to the article to be washed,

15 wherein the washing liquid is functional water obtained by altering properties of tap water in such a way that it offers higher detergent solubility or higher supersonic transmission efficiency.

20 30. A washing apparatus as claimed in claim 29,

wherein the functional water is acidic-ion or alkaline-ion water obtained by electrolyzing tap water.

31. A washing apparatus as claimed in claim 29,
wherein the functional water is soft water obtained by removing a hard-
water content from tap water.

5 32. A washing apparatus as claimed in claim 29,
wherein the functional water is obtained by deaerating tap water by
removing therefrom gas contents dissolved therein.

10 33. A washing apparatus as claimed in claim 29, further comprising:
a ultrasonic vibration horn for amplifying the supersonic vibration.

34. A washing apparatus that removes dirt from an article to be washed
by feeding a washing liquid agitated by supersonic vibration to the article to be
washed, comprising:

15 a functional water producing apparatus for producing functional water by
altering properties of tap water in such a way that it offers higher detergent
solubility or higher supersonic transmission efficiency.